

B. AMENDMENTS TO THE CLAIMS

1(Previously Amended). An apparatus for providing a virtual volume, the apparatus comprising:

a first plurality of disks;

a second plurality of back-end controllers coupled to the first plurality of disks for organizing and presenting the first plurality of disks as a third plurality of redundant arrays of disks; and

a front-end controller coupled to the second plurality of back-end controllers for generating mirror sets from at least one of the disks in a third plurality of redundant arrays of disks received from the second plurality of back-end controllers, striping at least one of the disks in the third plurality of redundant arrays of disks and presenting the striped arrays as a virtual volume.

2 (Original). The apparatus of claim 1 wherein the plurality of disks includes one or more spare disks.

3 (Previously Amended). The apparatus of claim 1 wherein the plurality of back-end controllers each include a plurality of busses, each coupled to one and only one of the disks associated with each of the plurality of redundant arrays of disks.

4 (Previously Amended). The apparatus of claim 1 wherein the plurality of back-end controllers comprises a RAID engine for presenting the plurality of disks as a plurality of RAID sets.

5 (Previously Amended). The apparatus of claim 4 wherein the RAID engine comprises a RAID engine for presenting the plurality of disks as a plurality of RAID-5 sets.

6 (Previously Amended). An apparatus for providing a virtual volume, the apparatus comprising:

a first plurality of disks;

a redundant array of independent disks (RAID) engine comprising a second plurality of back-end controllers coupled to the first plurality of disks

for organizing and presenting the first plurality of disks as a third plurality of RAID sets; and

a striping engine coupled to the RAID engine for receiving the third plurality of RAID sets as members, generating mirror sets from at least one of the disks in the third plurality of RAID sets from the second plurality of back-end controllers, striping at least one of the disks in the member RAID sets, and presenting the striped member RAID sets as a virtual volume.

7 (Original). The apparatus of claim 6 wherein the RAID engine comprises a RAID-5 engine.

8 (Previously Amended). An apparatus for providing a virtual volume, the apparatus comprising:

a first plurality of back-end controllers, each configured to organize and present X N-member RAID sets, and each having N busses capable of supporting X+1 disks each;

a second plurality of groups of X+1 disks, wherein each disk in the group is coupled to one of the N busses associated with one of the plurality of back-end controller busses; and

a local front-end controller coupled to the plurality of back-end controllers for receiving the X N-member RAID sets as members, striping the X N-member RAID sets, and presenting the striped X N-member RAID sets as a virtual volume,

wherein the local front-end controller is configured to generate mirror sets from the RAID sets received as members from different back-end controllers, to stripe the mirror sets, and to present the striped mirror sets as the virtual volume.

9 (Cancelled).

10 (Original). The apparatus of claim 8 wherein the plurality of back-end controllers includes primary local, redundant local, cloning, primary remote, and redundant remote back-end controllers.

11 (Previously Amended). The apparatus of claim 8 further comprising a remote front-end controller coupled to at least some of the

plurality of the back-end controllers for receiving RAID sets as members, striping the member RAID sets, and presenting the striped member RAID sets as the virtual volume.

12 (Original). The apparatus of claim 11 wherein the remote front-end controller is configured to generate mirror sets from the received RAID sets, to stripe the mirror sets, and to present the striped mirror sets as the virtual volume.

13 (Previously Amended). An electronic system comprising:
a computer; and
an apparatus coupled to the computer for presenting a virtual volume to the computer, the apparatus including:
a first plurality of disks;
a second plurality of back-end controllers coupled to the first plurality of disks for organizing and presenting the first plurality of disks as a third plurality of redundant arrays of disks; and
a front-end controller coupled to the second plurality of back-end controllers for generating mirror sets from at least one of the disks in the plurality of redundant arrays of disks, and striping the third plurality of redundant arrays of disks and presenting the striped redundant arrays of disks as the virtual volume.

14 (Previously Amended). A method of storing data on a first plurality of disks, the method comprising:
using a second plurality of back-end controllers, organizing the first plurality of disks into a second plurality of redundant arrays of disks;
using at least one front-end controller, generating mirror sets from at least one of the disks in the second plurality of redundant arrays of disks, striping at least one of the second plurality of redundant arrays of disks together to form a virtual volume; and
writing the data to the virtual volume.

15 (Previously Amended). The method of claim 14 wherein organizing the plurality of disks comprises organizing the plurality of disks into a plurality of RAID sets.

16(Previously Amended). The method of claim 15 wherein organizing the plurality of disks comprises organizing the plurality of disks into a plurality of RAID-5 sets.

17.(Previously Amended). The method of claim 14 wherein organizing the plurality of disks includes:

- providing one or more back-end controllers, each having a plurality of busses; and

- coupling the plurality of disks to the one or more back-end controller busses so that each bus is coupled to no more than one disk from each of the plurality of redundant arrays of disks and each bus is coupled to a spare disk.

18(Previously Amended). A method of storing data on a plurality of disks, the method comprising:

- using a plurality of back-end controllers, organizing the plurality of disks into a plurality of redundant arrays of disks;

- using at least one front-end controller, forming mirror sets from the plurality of redundant arrays of disks;

- using at least one front-end controller, striping the mirror sets together to form a virtual volume; and

- writing the data to the virtual volume.

19(Previously Amended). The method of claim 18 wherein organizing the plurality of disks comprises organizing the plurality of disks into a plurality of RAID sets.

20(Previously Amended). The method of claim 19 wherein organizing the plurality of disks comprises organizing the plurality of disks into a plurality of RAID-5 sets.